R-15

Code: 5G131

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Advanced Data Structures Through C++

(Common to CSE & IT)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　　Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Define a class and a class member. Explain static class members with the help of an example. 8M

   b) Discuss friend functions in C++ giving suitable example. 6M

OR

2. a) What is dynamic memory management? Write a C++ program demonstrating the usage of new and delete operators for a single variable as well as for an array. 6M

   b) Define a class Rectangle which has a length and a breadth. Define the constructors and the destructor and member functions to get the length and the breadth. Write a global function which creates an instance of the class Rectangle and computes the area using the member functions. 8M

UNIT–II

3. a) What's the difference between public, private, and protected? How can we protect derived classes from breaking when we change the internal parts of the base class? 7M

   b) What is Hybrid inheritance? Write a program to illustrate the concept of Hybrid Inheritance. 7M

OR

4. a) Write a C ++ program using stack ADT that reads an infix expression, converts the expression to postfix form and evaluates the postfix expression. 8M

   b) Explain the need for "Virtual Destructor". Can we have "Virtual Constructors"? 6M

UNIT–III

5. a) Define hashing, hash function and collision giving suitable examples. 7M

   b) Explain the different methods that are used to calculate hash functions. 7M

OR

6. a) Explain the linear probing method in Hashing? Also explain its performance analysis? 7M

   b) What is hashing with Chains? Explain? Compare this with Linear Probing? 7M

UNIT–IV

7. a) Write a method to find the height of a Binary Search Tree? 8M

   b) Explain the list representation of a tree by means of an example. 6M

OR

8. a) Explain different rotations in AVL Trees for insertion. 7M

   b) Explain insertion and deletion in a priority queue. 7M

UNIT–V

9. a) Define red-black tree. Find out the worst case time complexity if a new node is inserted in a red-black tree with n nodes (height of a red-black tree). 7M

   b) Define B-tree. Explain about insertion operation in a B-tree . 7M

OR

10. a) Discuss various types of pattern matching algorithms. 8M

    b) Explain how insertion and deletion operations is done on a Splay Tree. 6M

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R-15

Code: 5G132

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017
Digital Logic Design
(Computer Science & Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) i. Perform the following division in binary: 1011111 divided by 101
     ii. Convert decimal 9126 to both BCD and ASCII codes. For ASCII, an odd
         parity bit to be appended at the left   7M
   b) i. Express the following function in sum of minterms and product of maxterms:
     ii. $f(w, x, y, z) = x'z + w'z + xz$ 7M

OR

2. a) Convert the following with indicated bases to decimal $(4310)_5$ and $(198)_{12}$ 4M

   b) Convert the following to other canonical form:
      (i) $F(A, B, C) = \Sigma(1,3,7)$ (ii) $F(x, y, z) = \pi(0,1,2,3,4,6,12)$ 10M

UNIT–II

3. a) Draw logic diagram for the following Boolean expression
      (i) $Y = A'B' + B(A + C)$ (ii) $Y = (A + B)(C' + D)$ 6M

   b) Simplify the Boolean switching function and obtain its realization using only
      NAND gates. $F(A, B, C, D) = \Sigma(0,1,3,4,,6,9,11) + \Sigma(2,5)$ 8M

OR

4. Explain about integrated circuits in detail.   14M

UNIT–III

5. a) Design a combinational circuit that converts a 4-bit gray code to a 4-bit binary
      number; Implement the circuit with exclusive-OR gates.   7M

   b) Design a code converter that converts a decimal digit from the 8, 4, 2 -1 code
      to BCD.   7M

OR

6. a) Draw the logic diagram of a 2-to-4 line decoder using NOR gates only. Include
      an enable input.   6M

   b) Implement function $f(A, B, C, D) = \Sigma(1, 3, 4, 11, 12, 13, 14, 15)$ with 8X1 MUX   8M

7. a) Write short notes on
        (i)   Ripple counter
        (ii) Binary Ripple counter   8M

    b) Design a 4-bit binary synchronous counter with D flip-flops   6M

OR

8. a) Design a sequential circuit with two JK flip-flops A and B and two inputs E and x. If E=0, the circuit remains the same state regardless of the value of x, when E=1 and x=1 ,the circuit goes through the state transition from 00 to 01 to 10 to 11, and repeats. When E=1 and x=0, the circuit goes through the state transitions from 00 to 11 to 10 to 01 back to 00, and repeats.   10M

    b) Write the characteristic tables of
        (i)   D flip-flop
        (ii) T flip-flop   4M

9. a) Design a combinational circuit using a ROM. The circuit accepts a 3-bit number and generates an output binary number equal to square of the input number   7M

    b) Implement the following two Boolean functions with a PLA:
$$F1(A,B,C) = \Sigma(0,1,2,4)$$
$$F2(A,B,C) = \Sigma(0,5,6,7)$$
                                                                             7M

OR

10. a) Compare asynchronous and synchronous sequential circuits   6M

    b) The Boolean functions s or the inputs of an SR latch are
$$S = x_1', x_2' x_3 + x_1 x_{2 x3}$$
$$R = x_1 x_2' + x_2 x_3'$$
        Obtain the circuit diagram using a minimum number of NAND gates   8M

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Code: 5G431

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017
Discrete Mathematics
(Common to CSE & IT)

Max. Marks: 70   Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the difference between the principal of disjunctive and conjunctive normal forms.   7M

   b) Obtain the principal conjunctive normal form of the formula given by
   $(\sim P \rightarrow R) \wedge (Q \rightarrow P)$ 7M

OR

2. a) Write short notes on Universal Quantifiers   6M

   b) Prove or disprove the validity of the following arguments

        Every living thing is a plant or animal

        David's dog is alive and it is not a plant

        All animals have hearts

        Hence, David's dog has a heart   8M

UNIT–II

3. a) Explain the properties of relations with example?   8M

   b) Draw the Hasse diagram of the following set under the partial ordering relation "DIVIDES" {3,9,27,54}   6M

OR

4. a) Let z be the group of integers with the binary operation $*$ defined by $a*b = a+b-2$, for all $a, b \in z$. Find the identity element of the group $(z,*)$?   6M

   b) Explain Homomorphism, Isomorphism with an example   8M

UNIT–III

5. a) Explain pigeonhole principles with example.   6M

   b) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8, and 9 if no repetitions are allowed?   8M

OR

6. a) Find the number of ways of distributing 5 different books among 3 persons such that each one gets at least one book.   7M

   b) How many integral solutions are there to $x1 + x2 + x3 + x4 + x5 = 20$ where each $>= 2$?   7M

UNIT–IV

7. a) Find the coefficient of $x20$ in $(x^3 + x^4 + x^5 + \dots)_5$.   6M

   b) Find the coefficient of X^{15} in $A(X) = (x^3 + x^4 + x^5 + x^6 + x^7)(1 + X + \dots + X^{15})$ 8M

OR

8. a) Solve the recurrence relation $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n >= 3$.   6M

   b) Solve the recurrence relation $an - an-1 = 3n+2$, $a_0 = 1$, $n \ 1$ by substitution method.   8M

UNIT–V

9. a) State and explain the Four - Colour problem for planar graphs.   7M

   b) Prove that the regions of a plane graph can be 4 - colored if G has a Hamiltonian cycle.   7M

OR

10. a) Explain various types of graphs with examples   8M

    b) Prove that K5 is non-planar?   6M

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Code: 5G236

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Electrical Engineering and Electronics Engineering

(Common to CSE & IT)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1.	a)	Explain about different types of electrical elements?	7M
	b)	Deduce the equivalent resistance when R_1, R_2 and R_3 are connected in parallel.	7M

OR

2.	Derive the necessary equations for converting star to delta and Delta to star	14M

UNIT–II

3.	a)	With a neat sketch explain the constructional details and principle of operation of DC generator	10M
	b)	Write the applications of DC generators	4M

OR

4.	a)	Explain the working principle of DC motor with a neat diagram	7M
	b)	Derive the expression for torque of DC motor	7M

UNIT–III

5.	a)	How the efficiency of single phase transformer can be find out from the OC and SC tests.	14M

OR

6.	a)	Sketch the slip torque characteristics of three phase induction motor and explain	7M
	b)	Describe the procedure required to find out the efficiency of three phase induction motor by using a brake test.	7M

UNIT–IV

7.	a)	What is a PN junction diode and explain the V-I characteristics of PN junction diode	7M
	b)	What is rectifier and explain the operation of single phase half wave diode rectifier with a neat output waveforms	7M

OR

8.	a)	Draw and explain the input and output characteristics of CE amplifier	7M
	b)	How transistor can be acts as an amplifier	7M

UNIT–V

9.	a)	Explain about induction and dielectric heating and mention its industrial applications	14M

OR

10.	a)	Draw the block diagram of CRO and explain	7M
	b)	Explain any two applications of CRO	7M

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II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Probability & Statistics

(Computer Science and Engineering)

Max. Marks: 70 Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) If $A_1, A_2, A_3, \ldots, A_n$ are n events then show that

   (i). $P(\cap_{i=1}^{n} A_i) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$.

   (ii) $P(\cup_{i=1}^{n} A_i) \leq \sum_{i=1}^{n} P(A_i)$ 7M

   b) There are three companies X, Y, Z produce TVs. X produce twice as Y. While Y and Z produce the same number. It is known that 2% of X, 2% of Y and 4% of Z are defective. All the TVs produced are put into one shop and then one TV is chosen at random then **(i)** what is the probability that the TV is defective?

   (ii) Suppose a TV chosen is defective, what is the probability that this TV is produced by Company Y?   7M

OR

2. a) The probability that the students A, B, C, D solve a problem are $\frac{1}{3}, \frac{2}{5}, \frac{1}{5}$ and $\frac{1}{4}$ respectively. If all of them try to solve a problem then what is the probability that the problem is solved?   7M

   b) If A & B are independent events then show that a problem are the probability the A and B are independent.   7M

UNIT–II

3. a) Prove that the Poisson distribution is the limiting case of Binomial distribution for very large trails with very small Probability.   7M

   b) If the top 15% of the students receives A grade and bottom 10% receives F grade in Mathematics examination. Determine the (i) minimum mark to get A grade (ii) minimum mark to pass (not to get F grade). Assume that the marks are normally distributed with mean 76 and standard deviation 15.   7M

OR

4. a) If a Poisson distribution is such that $\frac{3}{2} P(X = 1) = P(X = 3)$ then find

   (i) mean   (ii) $P(X \geq 1)$ (iii) $P(2 < X < 5)$ (iv) $P(X \leq 3)$ 7M

   b) In a normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance.   7M

UNIT–III

5. a) A process of making certain ball bearing is under control if the diameters of the bearings have a mean of 0.5cm. If a random sample of 10 of these bearings has a mean diameter of 0.5060cm and standard deviation of 0.004cm, is the process under control?   7M

   b) Find the degree of confidence to assert that the average salary of school teachers is between Rs. 272 and Rs. 302 if a random sample of 100 such teachers revealed a mean salary of Rs. 287 with standard deviation of Rs. 48.   7M

OR

6. a) A population consists of four numbers 2,3,4,5. Consider all possible distinct samples of size 2 with replacement. Find **(i)** the population mean **(ii)** the population standard deviation **(iii)** the sampling distribution of means **(iv)** the mean of standard deviation of means.   7M

   b) Construct standard deviation of means for the population 3, 7, 11, 15 by drawing samples of size two without replacement. Determine (i) μ (ii) (iii) $\mu_{\bar{x}}$.   7M

UNIT–IV

7. a) A random sample of 400 flower stems has an average length of 15cms. Can this be regarded as a sample from a large population with mean 16cms &   is 5cm and also calculate the 95% confidence interval for the mean. 7M

   b) Experience had shown that 20% of a manufactured product is of the top quality. In one day, production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05level. 7M

OR

8. a) A study was conducted with 200 parents from north, 150 from south, 100 from east and 100 from west regions of India to determine the current attitude about prayers in public schools. Test at 0.01 level of significance for homogeneity of attitudes of parents among the four regions concerning prayers in the public schools. 7M

   b) In a study on the influence of habitation, the intelligent quotients (IQs) of 16 students from urban area was found to have a mean of 107 and standard deviation of 10, while the IQs of 14 students from a rural area showed a mean of 112 and standard deviation of 8. Determine whether the IQs differ significantly at (i) 0.01 (b) 0.05 levels. 7M

UNIT–V

9. a) Is there reason to believe that the life expected in south and north India is same or not from the following data

South	34	39.2	46.1	48.7	49.4	45.9	55.3	42.7	43.7		
North	49.7	55.4	57	54.2	50.4	44.2	53.4	57.5	61.9	56.6	58.2

   7M

   b) Three cough syrups A, B, C were used on patients with cough with the following results:

   Cough Syrup

	A	B	C	Total
Cured	41	27	22	90
Not Cured	79	53	78	210
Totals	120	80	100	300

   Can we conclude whether there is significant (at 0.05 level) difference among the proportion of patients cured by the three brands A,B,C? 7M

OR

10. a) Test for goodness of fit of a uniform distribution to the following data obtained when a die is tossed 120 times. Use 0.05 L.O.S.

Face	1	2	3	4	5	6
Observed	20	22	17	18	19	24
Expected	20	20	20	20	20	20

   7M

   b) Test for goodness of fit of normal distribution to the following data;

Class	0-100	100-250	250-500	500-750	750-1000	1000-1250	1250-1500
Frequency	7	9	19	12	8	5	4

   7M

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II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Principles of Programming Languages
(Computer Science and Engineering)

Max. Marks: 70   Time: 3 Hours
Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Discuss language evaluation criteria and the characteristics that affect them?   7M
    b) Define program language features?   7M

OR

2. a) List the three general methods of implementing a programming language?   7M
    b) Explain syntax of declaration statement in PASCAL using BNF notation and syntax
       graphs?   7M

UNIT–II

3. a) Define heterogeneous array? Discuss the design issues of arrays?   7M
    b) Discuss structural and name equivalence for types? Give an example of a language
       used for each approach?   7M

OR

4. a) Explain in detail the design issues of arithmetic expressions?   7M
    b) Explain the different types of relational operators used in C, Ada and Fortran 95?   7M

UNIT–III

5. a) Discuss the importance of various control statements in programming languages?   7M
    b) Explain Compound Statements, Selection and Iteration statements with examples?   7M

OR

6. a) Define subprograms? What are the advantages of subprograms? Explain different
       methods of parameter passing mechanisms to subprograms?   7M
    b) Discuss with suitable examples static and dynamic scope?   7M

UNIT–IV

7. a) List out the features of abstract Data types?   6M
    b) Differentiate java packages and c++ namespaces?   8M

OR

8. a) Discuss how parameter passing techniques are implemented and explain type
       checking techniques?   7M
    b) Discuss the reasons for using exception handlers in a programming language. What
       if there exist programming languages with no exception handlers?   7M

UNIT–V

9. a) Explain different types of propositions present in logic programming?   7M
    b) Define rule and goal statements of prolog?   7M

OR

10. a) Describe the scoping rule in common LISP, ML and HASKELL?   7M
    b) Explain structures and arrays in ML .give examples?   7M

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